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10/661,322	09/12/2003	Laxmi Priya Parida	YOR920030299US1	9308

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EXAMINER

COUGHLAN, PETER D

ART UNIT	PAPER NUMBER
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2129

DATE MAILED: 04/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/661,322	Applicant(s) PARIDA ET AL.	
	Examiner Peter Coughlan	Art Unit 2129	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 September 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 September 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Detailed Action

1. Claims 1-29 are pending in this application.

Drawings

2. There is a problem with Figs. 3A and 3B. and the relating paragraph [0074].

According to the specification, row 250 pertains to the initial frequency of a substring.

Paragraph [0074] example is 'cboljikgiki'. Paragraph [0074] states that entry 250-9 has the value of two because there are two 'i' in the substring. Therefore entry 250-10 has the entry of two meaning there are two 'j' in the substring. There are not two 'j' in the substring so either Figs. 3A and 3B and/or paragraph [0074] is/are incorrect. These errors stated and all other errors in both the specification and figures must be corrected.

35 USC § 101

3. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

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Claims 1-29 are rejected under 35 U.S.C. 101 for nonstatutory subject matter. The computer system must set forth a practical application of that § 101 judicial exception to produce a real-world result. Benson, 409 U.S. at 71-72, 175 USPQ at 676-77. The invention is ineligible because it has not been limited to a substantial practical application. The application is an algorithm that searches for patterns along a one-dimensional array. There has to be an application for this method to be employed with to have a useful purpose.

In determining whether the claim is for a "practical application," the focus is not on whether the steps taken to achieve a particular result are useful, tangible and concrete, but rather that the final result achieved by the claimed invention is "useful, tangible and concrete." If the claim is directed to a practical application of the § 101 judicial exception producing a result tied to the physical world that does not preempt the judicial exception, then the claim meets the statutory requirement of 35 U.S.C. § 101.

Finding patterns in strings at an academic level is not clear in its purpose or scope. There has to be a reason for finding such strings and their usefulness in a real world application, is questioned. The application as it stands is strictly an academic exercise with no useful and tangible function and/or result.

The invention must be for a practical application and either:

- 1) specify transforming (physical thing) or
- 2) have the FINAL RESULT (not the steps) achieve or produce a
useful (specific, substantial, AND credible),

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concrete (substantially repeatable/ non-unpredictable), AND
tangible (real world/ non-abstract) result.

A claim that is so broad that it reads on both statutory and non-statutory subject matter, must be amended, and if the specification discloses a practical application but the claim is broader than the disclosure such that it does not require the practical application, then the claim must be amended.

Claims that recites an algorithm with given parameters with no reason why and no stated use is not statutory.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 2, 5-14, 17, 22-26, 29 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for describing the method of generating new names for new patterns not consistent with the specifications matching Figures 3A and 3B. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to applying the factors set forth. In re Wands, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404 (Fed. Cir. 1998). These

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Figures pertain to paragraph [0074]. Errors in the specification and in the drawings must be corrected.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-17, 20-26, 29 are rejected under 35 U.S.C. 102(b) (hereinafter referred to as **Floratos**) being anticipated by Floratos, 'DELPHI: A pattern-based method for detecting sequence similarity'.

Claim 1.

Floratoes anticipates selecting a new portion of the input string, the new portion differing from a previously selected portion of the input string by at least one new character of the input string (**Floratos**, p457 C1:26 through C2:4; 'Window size' of applicant is equivalent to 'W' of Floratos. When in search mode, the method searches strings of width W. Since a string is being searched this is done by inputting a new portion of the string on one end of the width and removing an old portion at the other

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end of the width, similar to a window of size 'W' moving down a one-dimensional array.); determining one or more values for how many of the at least one new characters are in the portion of the input string (**Floratos**, p457 C1:26 through C2:4; 'Determining one or more values' of applicant is equivalent to 'L' of Floratos. Where 'L' is the number of matches in a pattern query 'Q'); determining which, if any, names in a plurality of sets of names have changed by selection of the new portion, the plurality of sets comprising a first set and a plurality of additional sets, wherein the first set corresponds to all of the characters in the alphabet and to values of how many of the characters of the alphabet are in the previously selected portion, wherein the values are names for the first set, and wherein each additional set comprises names corresponding to selected pairs of names from a single other set (**Floratos**, p457 C2:5-15; 'First set' of applicant is equivalent to 'query sequence (Q)' of Floratos. 'Additional sets' of applicant is equivalent to matches of 'Q'. 'Single other set' of applicant is equivalent to 'D' of Floratos.); and using changes in the names to determine the permutation patterns. (**Floratos**, p457 C2:5-15; 'Permutation patterns' of applicant is equivalent to 'K' of Floratos.)

Claims 2 and 21.

Floratos anticipates the at least one processor (**Floratos**, p471, C1:6-32) is further configured, in order to determine the plurality of levels (**Floratos**, p457, C1:26-43; 'Plurality of levels' determination is preformed by 'level of our pattern discovery

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algorithm' of Floratos.): to determine the first set by determining values of how many of each of the characters of the alphabet are in the previously selected portion (**Floratos**, C457, C1:26-43; 'How many of each characters' of applicant is equivalent to 'density' of Floratos.); and to determine the additional sets by assigning names for a given additional set to selected pairs of names from another of the sets, wherein each assigned name is unique to the names for a selected pair. (**Floratos**, p456 C2:44 through p457 C1:7; 'Assigning names' of applicant is equivalent to 'offset list' of Floratos.)

Claim 3.

Floratos anticipates wherein the assigned names are codes. (**Floratos**, p456, C2:20-38; In this example the code is ("A.CH..E"))

Claim 4.

Floratos anticipates wherein the codes are natural numbers. (**Floratos**, p457, C1:17-25; Floratos illustrates the 'backbone' which indicates the importance of location among the query pattern. For example the 'backbone' of the sample in claim 3 would be "1011001".)

Claims 5 and 22.

Floratos anticipates wherein the at least one processor (**Floratos**, p471, C1:6-32) is further configured, when determining which, if any, names in a plurality of sets of

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names have changed determines that a name has changed to determine that a new name is needed for the changed name. (**Floratos**, p457 C2:44 through p458 C2:15; 'Set of names' of applicant is equivalent to ' π ' (or set of <L, W> patterns). The process of 'determining' of applicant is equivalent to 'pattern matching' of Floratos.)

Claim 6.

Floratos anticipates wherein the step of determining which, if any, names in a plurality of sets of names have changed further comprises the step of selecting a new name, not currently in use in the sets of names, for the changed name. (**Floratos**, p458 C1:5 through C2:15 and Figure 1; This pertains to the generation of hash values for every substring. 'New name' of applicant is equivalent to 'hash value' of Floratos.)

Claims 7 and 23.

Floratos anticipates wherein the at least one processor (**Floratos**, p471, C1:6-32) is further configured to determine, for a name that has changed in the sets of names, a location in the input string that corresponds to the changed name. (**Floratos**, p458 C1:5 through C2:32 and Figure 2; A hash table will 'point' to a particular list of offsets of a substring.)

Claim 8.

Floratos anticipates wherein the changed name corresponds to at least two characters of the input string and a location in the input string of a given character of the

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at least two characters is chosen as the determined location. (**Floratos**, Figures 1 and 2; The generation of hash values is based at least two characters and using the hash values to generate a hash table which 'points' to the beginning of a substring.)

Claims 9 and 24.

Floratos anticipates wherein each of the names in the sets of names corresponds to a pattern, and wherein the at least one processor (**Floratos**, p471, C1:6-32) is further configured, when using changes in the names, to select permutation patterns from the patterns. (**Floratos**, p458 C2:16-32; 'Select permutation patterns' of applicant is equivalent to finding two residues of a substring.)

Claim 10.

Floratos anticipates the step of comparing names that have changed in the sets of names to a database comprising a plurality of stored names. (**Floratos**, p458 C2:46 through p459 C1:4; Floratos illustrates comparing two names that share the same location.)

Claims 11 and 25.

Floratos anticipates wherein the additional sets have names corresponding to only a single pair of names from another set. (**Floratos**, p459, C1:5-22; The 'pair of names' of applicant are 'chained' by Floratos resulting in 'additional sets' of applicant.)

Claims 12 and 26.

Floratos anticipates wherein the at least one processor (**Floratos**, p471, C1:6-32) is further configured, when using changes in the names to determine permutation patterns, to correlate the changed names with permutation patterns. (**Floratos**, p457 C2:44 through p458 C2:32; 'Determine permutation patterns' and 'correlate' of applicant is equivalent to 'searching' and 'pattern matching' of Floratos.)

Claim 13.

Floratos anticipates wherein the step of determining which, if any, names in a plurality of sets of names further comprises, for each changed name, updating a count corresponding to that changed name (**Floratos**, p458 C2:16-32; 'Updating count' of applicant is equivalent to 'increment by one' of Floratos.), and wherein the method further comprises the step of: performing the steps of selecting, determining one or more values, and determining which, if any, names in a plurality of sets of names until the entire input string has been selected. (**Floratos**, p458 C2:16-32; 'Until the entire input string' of applicant is equivalent to when the counter C, is $C[i]$ equals $(n-1)$ of Floratos.)

Claim 14.

Floratos anticipates wherein portions selected have a predetermined size, and wherein the method further comprises the step of selecting a number of predetermined sizes and performing the steps of selecting, determining one or more values, and

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determining which, if any, names in a plurality of sets of names for each of the predetermined sizes. (**Floratos**, p459 C2:18 through p460 C1:7; 'Determining one of more values' of applicant is equivalent to 'L, W and K_{\min} ' of Floratos.)

Claim 15.

Floratos anticipates wherein the step of using changes further comprises the step of determining permutation patterns corresponding to counts greater than or equal to a predetermined count. (**Floratos**, p462 C2:5 through p463 C1:17; Here Floratos illustrates an example of permutation patterns where $k_{\min} = 15$ and only patterns with support of 15 or higher are counted.)

Claim 16.

Floratos anticipates the step of determining maximal permutation patterns from the determined permutation patterns. (**Floratos**, p457 C1:8-14)

Claim 17.

Floratos anticipates the step of determining which, if any, names in a plurality of sets of names further comprises the step of determining location lists for each of the names corresponding to permutation patterns (**Floratos**, p458 C1:5 through C2:32 and Figure 2; 'Location lists' of applicant is equivalent to 'hash table' of Floratos.), and wherein the step of determining maximal permutation patterns further comprises the steps of comparing location lists for permutation patterns and eliminating duplicate

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permutation patterns by using the location lists. (**Floratos**, p458 C2:33 through p459 C1:22; 'Eliminating duplicate permutation patterns' of applicant is accomplished by 'chaining' of Floratos.)

Claim 20.

Floratoes anticipates a memory (**Floratos**, p471, C1:6-32) ; at least one processor coupled to the memory, the at least one processor configured: to select a new portion of the input string, the new portion differing from a previously selected portion of the input string by at least one new character of the input string (**Floratos**, p457 C1:26 through C2:4; 'Window size' of applicant is equivalent to 'W' of Floratos. When is search mode the method searches at strings of width W. Since a string is being searched this is done by inputting a new portion of the string on one end of the width and removing an old portion at the other end of the width. Must like a window of size 'W' moving down a one-dimensional array.); to determine one or more values for how many of the at least one new characters are in the portion of the input string (**Floratos**, p457 C1:26 through C2:4; 'Determining one or more values' of applicant is equivalent to 'L' of Floratos. Where 'L' is the number of matches in a pattern query 'Q'); determine which, if any, names in a plurality of sets of names have changed by selection of the new portion, the plurality of sets comprising a first set and a plurality of additional sets, wherein the first set corresponds to all of the characters in the alphabet and to values of how many of the characters of the alphabet are in the previously selected portion, wherein the values are names for the first set, and wherein each

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additional set comprises names corresponding to selected pairs of names from a single other set (**Floratos**, p457 C2:5-15; 'First set' of applicant is equivalent to 'query sequence (Q)' of Floratos. 'Additional sets' of applicant is equivalent to matches of 'Q' 'Single other set' of applicant is equivalent to 'D' of Floratos.); and to use changes in the names to determine the permutation patterns. (**Floratos**, p457 C2:5-15; 'Permutation patterns' of applicant is equivalent to 'K' of Floratos.)

Claim 29.

Floratoes anticipates a computer readable medium (**Floratos**, p471, C1:6-32) containing one or more programs which when executed implement the steps of: selecting a new portion of the input string, the new portion differing from a previously selected portion of the input string by at least one new character of the input string (**Floratos**, p457 C1:26 through C2:4; 'Window size' of applicant is equivalent to 'W' of Floratos. When is search mode the method searches at strings of width W. Since a string is being searched this is done by inputting a new portion of the string on one end of the width and removing an old portion at the other end of the width. Must like a window of size 'W' moving down a one-dimensional array.); determining one or more values for how many of the at least one new characters are in the portion of the input string (**Floratos**, p457 C1:26 through C2:4; 'Determining one or more values' of applicant is equivalent to 'L' of Floratos. Where 'L' is the number of matches in a pattern query 'Q'); determining which, if any, names in a plurality of sets of names have changed by selection of the new portion, the plurality of sets comprising a first set and a

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plurality of additional sets, wherein the first set corresponds to all of the characters in the alphabet and to values of how many of the characters of the alphabet are in the previously selected portion, wherein the values are names for the first set, and wherein each additional set comprises names corresponding to selected pairs of names from a single other set (**Floratos**, p457 C2:5-15; 'First set' of applicant is equivalent to 'query sequence (Q)' of Floratos. 'Additional sets' of applicant is equivalent to matches of 'Q' 'Single other set' of applicant is equivalent to 'D' of Floratos.); and using changes in the names to determine the permutation patterns. (**Floratos**, p457 C2:5-15; 'Permutation patterns' of applicant is equivalent to 'K' of Floratos.)

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 18 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Floratos as set forth above, in view of Savitch ('Problem Solving with C++', referred to as **Savitch**)

Claims 18 and 27.

Floratos fails to particularly call for at least one character is a single character and wherein the step of selecting further comprising selecting a portion of the input string that differs from the previously selected portion of the input string by moving a window one character, from the previously selected portion, along the input string, the window selecting the new portion of the input string.

Savitch teaches at least one character is a single character and wherein the step of selecting further comprising selecting a portion of the input string that differs from the previously selected portion of the input string by moving a window one character, from the previously selected portion, along the input string, the window selecting the new portion of the input string. (**Savitch**, p533:1-17; Savitch illustrates one method for moving down an array with a window width of 1.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Floratos by illustrating with a basic algorithm of moving a 'window' down an array as taught by Savitch to at least one character is a single character and wherein the step of selecting further comprising selecting a portion of the input string that differs from the previously selected portion of the input string by moving a window one character, from the previously selected portion, along the input string, the window selecting the new portion of the input string.

For the purpose of having the ability to move across a substring with a window as a domain looking for patterns.

Claim Rejections - 35 USC § 103

7. Claims 19 and 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Floratos, and Savitch, as set forth above, and further in view of Fredman ('Two Applications of a Probabilistic search technique: Sorting X+Y and Building Balanced Search Trees', referred to as **Fredman**)

Claims 19 and 28.

Floratos and Savitch do not teach wherein the sets of names are stored in a balanced search tree.

Fredman teaches wherein the sets of names are stored in a balanced search tree. (**Fredman**, p242:33 through p244:20) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify combined teachings of Floratos and Savitch by employing a balanced search tree as taught by Fredman to have wherein the sets of names are stored in a balanced search tree.

For the purpose of having $O(\log |BAL[a]|) = O(\log(n))$ for searches.

Conclusion

8. The prior art of record and not relied upon is considered pertinent to the applicant's disclosure.

-A. Arir., A. A.postolico, C. M. Landau, and G. Satta. Efficient text fingerprinting via parikh mapping. Journal of Discrete Algorithms, 2003.

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-J Tamames, C Casari, C Ouzounis, and A Valencia. J. Mol. Evol., 44:66 73, 1997.

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-'Nucleic Acids Research': I. Rigoutsos, T Huynh, A Floratos, L. Parida, D. Platt, 2002

-'The Emergence of Pattern Discovery Techniques in Computer Biology', I.

Rigoutsos, A. Floratos, L. Parida, Y. Gao, D. Platt, 2000

-Introduction to Algorithms, T. Cormen, C. Leiserson, and R. Rivest, 1991.

-U. S. Patent Publication 20030046010: Parida

-U. S. Patent 6571199: Floratos

-U. S. Patent 6341284: Floratos

-U. S. Patent 6373971: Floratos

-U. S. Patent 6205444: Floratos

-U. S. Patent 6571230: Parida

-U. S. Patent Publication: Parida

9. Claims 1-29 are rejected.

Correspondence Information

10. Any inquiry concerning this information or related to the subject disclosure should be directed to the Examiner Peter Coughlan, whose telephone number is (571) 272-5990. The Examiner can be reached on Monday through Friday from 7:15 a.m. to 3:45 p.m.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor David Vincent can be reached at (571) 272-3687. Any response to this office action should be mailed to:

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have any questions on access to Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).



Peter Coughlan

3/22/2006



DAVID VINCENT
SUPERVISORY PATENT EXAMINER